General

Guideline Title

Best evidence statement (BESt). Use of pressure therapy for management of hypertrophic scarring.

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BESt). Use of pressure therapy for management of hypertrophic scarring. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2014 Mar 13. 10 p. [46 references]

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The strength of the recommendation (strongly recommended, recommended, or no recommendation) and the quality of the evidence (1aâ€'5b) are defined at the end of the "Major Recommendations" field.

When to Use Pressure Therapy (see table in the original guideline document)

1. It is strongly recommended that pressure therapy be used to decrease hypertrophic scar height (Anzarut et al., 2009 [1b]; Candy, Cecilia, & Ping, 2010 [2a]; Engrav et al., 2010 [2a]; Van den Kerckhove et al., 2005 [2a]; Li-Tsang, Zheng, & Lau, 2010 [2b]; Garcia-Velasco et al., 1978 [2b]; Cheng et al., 2001 [4a]; Bloemen et al., 2009 [5a]; Berman & Flores, 1998 [5a]; Berman et al., 2008 [5b]).
2. It is recommended that pressure therapy be used to decrease hypertrophic scar erythema (Candy, Cecilia, & Ping, 2010 [2a]; Garcia-Velasco et al., 1978 [2b]; Cheng et al., 2001 [4a]).
3. There is insufficient evidence and a lack of consensus to make a recommendation for the use of pressure therapy to increase scar pliability or joint range of motion (Engrav et al., 2010 [2a]; Li-Tsang, Zheng, & Lau, 2010 [2b]; Garcia-Velasco et al., 1978 [2b]; Klöti & Pochon, 1982 [3a]; Haq & Haq, 1990 [3b]; Gauglitz et al., 2011 [5a]; Bloemen et al., 2009 [5a]; Berman et al., 2008 [5b]).
4. It is recommended that pressure therapy not be used:
    a. For decreasing abnormal scar pigmentation (Anzarut et al., 2009 [1b]; Candy, Cecilia, & Ping, 2010 [2a]; Engrav et al., 2010 [2a]; Van den Kerckhove et al., 2005 [2a]).
    b. To hasten the rate or time to scar maturation (Chang et al., 1995 [2b]).

How to Use Pressure Therapy

5. It is recommended that pressure therapy appliances are:
    a. Used as a prophylactic measure for wounds that take longer than 14 to 21 days to heal, as well as all skin grafts, as these wounds are

more likely to develop hypertrophic scars than those which heal more quickly (Deitch et al., 1983 [4a]; Bloemen et al., 2009 [5a], Davoodi, Fernandez, & O, 2008 [5b], Staley et al., 1997 [5b]).

b. Used as soon as the healing skin can tolerate the pressure and/or shear force generated by the intervention (Klöti & Pochon, 1982 [3a]; Klöti & Pochon, 1979 [3b]; Gauglitz et al., 2011 [5a]; Ogawa, 2010 [5a]; Bloemen et al., 2009 [5a]; Esselman et al., 2006 [5a]; Latenser & Kowal-Vern, 2002 [5a]; Mustoe et al., 2002 [5a]; Davoodi, Fernandez, & O, 2008 [5b]; Staley et al., 1997 [5b]; Robson et al., 1992 [5b]).
c. Used for 23 hours per day for approximately 12 months, or until scar maturation is achieved (Haq & Haq, 1990 [3b]; Bloemen et al., 2009 [5a]; Latenser & Kowal-Vern, 2002 [5a]; Niessen et al., 1999 [5a]; Berman et al., 2008 [5b]; Davoodi, Fernandez, & O, 2008 [5b]).
d. Custom fit to assure optimal pressure without causing tissue damage by being:
    i. Fit by skilled/trained/experienced individuals (Yamaguchi et al., 1986 [2a]).
    Note: Monitor fit regularly, by the skilled individual, to prevent tissue damage.

    ii. Fit to achieve compression force near capillary pressure (20 to 30 mmHg) (Candy, Cecilia, & Ping, 2010 [2a]; Engrav et al., 2010 [2a]; Van den Kerckhove et al., 2005 [2a]; Yamaguchi et al., 1986 [2a]; Garcia-Velasco et al., 1978 [2b]; Bloemen et al., 2009 [5a]; Latenser & Kowal-Vern, 2002 [5a]; Berman & Flores, 1998 [5a]; Davoodi, Fernandez, & O, 2008 [5b]; Staley et al., 1997 [5b]).
    Note: It is impractical to use a pressure mapping device (such as Tekscan®) to determine exact pressure in the clinic environment. Instead, skilled clinicians approximate this by placing a finger between the appliance and the skin and by observing the physical tension on the appliance. This skill can be taught to caregivers to provide safe and optimal care (Local Consensus, 2014 [5]).

    iii. Replaced or modified every 2 to 3 months in order to maintain the pressure needed to achieve optimal outcome (Candy, Cecilia, & Ping, 2010 [2a]; Garcia-Velasco et al., 1978 [2b]; Esselman et al., 2006 [5a]).
    Note: Pressure appliances can be modified by re-sewing or inserts can be added to assure pressure of 20 to 30 mmHg (Candy, Cecilia, & Ping, 2010 [2a]; Davoodi, Fernandez, & O, 2008 [5b]).

Definitions:

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

†a = good quality study; b = lesser quality study.

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).
It is recommended that… It is recommended	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.

Strength	Definition
that…not…	There is insufficient evidence and a lack of consensus to make a recommendation…

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Hypertrophic scarring

Guideline Category

Management

Treatment

Clinical Specialty

Dermatology

Pediatrics

Plastic Surgery

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To evaluate, among individuals with or at risk for developing active hypertrophic scars, if treatment with pressure therapy compared to no scar treatment improves aesthetic and functional outcomes

Target Population

Individuals with active hypertrophic scars or those who are at high risk for development of hypertrophic scars, particularly those with skin grafts or tissue injury requiring more than 14 days to heal, tissue injury with a family history of developing hypertrophic scars, or tissue injury with darker pigmented skin tones

Note: Individuals with unhealed or infected wounds, compromised circulation, mature scars, or keloid scars are excluded from this guideline.

Interventions and Practices Considered

Pressure therapy

Major Outcomes Considered

Improved aesthetic and functional outcomes

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Search Strategy

- Databases: MEDLINE, CINAHL, Cochrane Libraries, and hand search of relevant articles through use of reference lists
- Search Engines: Burntherapist.com, Google Scholar, OT Seeker, PEDro.org, PubMed.gov, PubMed Clinical Queries, Cochrane Database for Systematic Reviews (CDSR)
- Search Terms: Scar, hypertroph*, pressure therapy, compression therapy, pressure garment, burn, scald, trauma, MeSH terms: cicatrix, hypertrophic
- Limits and Filters: Humans and English Language, no age limitations
- Search Dates: January 1, 1970 to February 1, 2014

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Table of Evidence Levels

Quality Level	Definition
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
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4a or 4b	Weak study design for domain
5a or 5b	General review, expert opinion, case report, consensus report, or guideline
5	Local Consensus

Quality Level	Definition

†a = good quality study; b = lesser quality study.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Table of Language and Definitions for Recommendation Strength

Strength	Definition
It is strongly recommended that… It is strongly recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is high support that benefits clearly outweigh risks and burdens (or vice-versa for negative recommendations).
It is recommended that… It is recommended that… not…	When the dimensions for judging the strength of the evidence are applied, there is moderate support that benefits are closely balanced with risks and burdens.
There is insufficient evidence and a lack of consensus to make a recommendation…	

Note: See the original guideline document for the dimensions used for judging the strength of the recommendation.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Peer Review

Description of Method of Guideline Validation

This Best Evidence Statement (BESt) has been reviewed against quality criteria by two independent reviewers from the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence Collaboration.

Evidence Supporting the Recommendations

References Supporting the Recommendations

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Berman B, Flores F. The treatment of hypertrophic scars and keloids. Eur J Dermatol. 1998 Dec;8(8):591-5. PubMed

Berman B, Viera MH, Amini S, Huo R, Jones IS. Prevention and management of hypertrophic scars and keloids after burns in children. J Craniofac Surg. 2008 Jul;19(4):989-1006. PubMed

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Haq MA, Haq A. Pressure therapy in treatment of hypertrophic scar, burn contracture and keloid: the Kenyan experience. East Afr Med J. 1990 Nov;67(11):785-93. PubMed

KlÃ¶ti J, Pochon JP. Conservative treatment using compression suits for second and third degree burns in children. Burns. 1982 Jan;8(3):180-7. PubMed

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Li-Tsang CW, Zheng YP, Lau JC. A randomized clinical trial to study the effect of silicone gel dressing and pressure therapy on posttraumatic hypertrophic scars. J Burn Care Res. 2010 May-Jun;31(3):448-57. PubMed

Mustoe TA, Cooter RD, Gold MH, Hobbs FD, Ramelet AA, Shakespeare PG, Stella M, TÃ©ot L, Wood FM, Ziegler UE, International Advisory Panel on Scar Management. International clinical recommendations on scar management. Plast Reconstr Surg. 2002 Aug;110(2):560-71. PubMed

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Ogawa R. The most current algorithms for the treatment and prevention of hypertrophic scars and keloids. Plast Reconstr Surg. 2010 Feb;125(2):557-68. PubMed

Robson MC, Barnett RA, Leitch IO, Hayward PG. Prevention and treatment of postburn scars and contracture. World J Surg. 1992 Jan-Feb;16(1):87-96. PubMed

Staley M, Richard R, Billmire D, Warden G. Head/face/neck burns: therapist considerations for the pediatric patient. J Burn Care Rehabil. 1997 Mar-Apr;18(2):164-71. PubMed

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Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Pressure therapy primarily impacts aesthetic components of the scar, providing significant improvement in scar height and erythema. In addition, pressure therapy fosters improved skin health and prevents joint contractures which inhibit function in activities of daily life. While the impact on

each scar is significant, the degree to which the improvement is beneficial to the patient as a whole depends on the size, location, and severity of the scar itself.

Potential Harms

- Pressure therapy treatment is considered to be conservative in nature and with moderate risks. Most common risks to health target skin integrity and include recurrent mild blistering, rash, eczema, itching, discomfort and/or embarrassment caused by wearing the appliances.
- Adherence to the lengthy, uncomfortable and conspicuous treatment is often difficult for patients and their caregivers.

Qualifying Statements

Qualifying Statements

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Implementation of the Guideline

Description of Implementation Strategy

Applicability and Feasibility Issues

The biggest threat to successful implementation of a pressure therapy protocol is achieving patient/family compliance or adherence. Problems with adherence to pressure therapy may be attributed to the moderate risks of the treatment, mainly regarding skin irritation and discomfort. Other articles cited length of treatment, appliance cost and rapid appliance loss of pressure as factors contributing to non-adherence. However, one study found that only 41% of adults were fully compliant with the prescribed pressure therapy program, due more to "rational choices made by patients in the face of several difficulties" rather than simple irritation. Additionally, studies regarding adherence to other therapy interventions have found similar results, despite minimal risks or unpleasant side effects. Therefore, successful remediation of patient non-adherence may be a broader therapeutic problem, rather than one unique to pressure therapy for hypertrophic scars. One study successfully utilized showing patients outcome photos of scars treated with pressure versus no treatment. Self-management techniques have also been shown to be helpful in promoting adherence. Self-management is the ability of the client and his/her family to collaborate on and adhere to individualized therapy treatment recommendations and appropriately handle signs/symptoms/difficulties associated with the therapy diagnosis to maximize quality of life and participation in life roles.

Implementation Tools

Audit Criteria/Indicators

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Cincinnati Children's Hospital Medical Center. Best evidence statement (BESt). Use of pressure therapy for management of hypertrophic scarring. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2014 Mar 13. 10 p. [46 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2014 Mar 13

Guideline Developer(s)

Cincinnati Children's Hospital Medical Center - Hospital/Medical Center

Source(s) of Funding

Cincinnati Children's Hospital Medical Center

Guideline Committee

Not stated

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Financial Disclosures/Conflicts of Interest

Conflict of interest declaration forms are filed with the Cincinnati Children's Hospital Medical Center (CCHMC) Evidence-Based Decision Making (EBDM) group. No financial or intellectual conflicts of interest were found.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available from the Cincinnati Children's Hospital Medical Center Web site .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

Availability of Companion Documents

The following are available:

> Judging the strength of a recommendation. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the Cincinnati Children's Hospital Medical Center (CCHMC) Web site .
> Grading a body of evidence to answer a clinical question. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the CCHMC Web site .
> Table of evidence levels. Cincinnati (OH): Cincinnati Children's Hospital Medical Center; 2009 May 7. 1 p. Available from the CCHMC Web site .

Print copies: For information regarding the full-text guideline, print copies, or evidence-based practice support services contact the Cincinnati Children's Hospital Medical Center James M. Anderson Center for Health Systems Excellence at EBDMInfo@cchmc.org.

In addition, suggested process or outcome measures are available in the original guideline document .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on June 18, 2014.

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